UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, DC 20460

OFFICE OF CHEMICAL SAFETY AND POLLUTION PREVENTION

August 04, 2016

PC Codes: 051505
DP Barcodes: 427259 & 433204

MEMORANDUM

Subject: **2,4-D Choline: Characterization of the Spray Performance of Various Tank Mix Additives for GF-2726 (Enlist Duo) Formulation**

From: Faruque Khan, Ph.D., Senior Fate Scientist
Environmental Risk Branch 1
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Thru: Sujatha Sankula, Ph.D., Branch Chief
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SUJATHA SANKULA Digitally signed by SUJATHA SANKULA DN: c=US, o=U.S. Government, ou=USEPA, ou=Staff, cn=SUJATHA SANKULA, dnQualifier=0000034075 Date: 2016.08.04 15:09:28 -04'00'

To: Emily Schmid, Risk Manager Reviewer
Kathryn Montague, Risk Manager, PM 23
Dan Kenny, Chief
Herbicide Branch
Registration Division (7505P)

The Environmental Fate and Effects Division has reviewed ten studies related to potential tank mix additives for their compatibility with the GF-2726 (Enlist Duo) formulation of 2,4-D with respect to droplet size spectra and AGDISP deposition. The objective of these studies was to determine whether the potential spray drift from tank mix additives extends beyond the bench mark 30-ft downwind deposition of GF-2726 alone. A total of 52 tank mix additives were submitted in ten studies listed in Table 1.

Forty three tank mix additives containing GF-2726 formulation and GF-2726 solo were evaluated in a low-speed wind tunnel and the results were submitted in the MRID # 49876701. Preliminary screening of this study suggests that critical raw data were not included in the submitted study. Therefore, the study is classified as **unacceptable but upgradeable and a DER is not generated.** EFED recommends that the registrant resubmit this study with the missing raw data along with the deficiencies below addressed so the study can be re-evaluated and potentially upgraded.

- The raw data of calibration measurements of air speed in the wind tunnel and the flow rate of nozzles with various tank mix additives were not provided in the study report.

- The densities of tank mix additives are not included in the study report. Densities of tank mix additives should be included in the report to verify the calculations of volume fractions of non-volatile fraction, an important input parameter of the AGDISP model.

- The estimated deposition of AGDISP for each replication for both GF-2726 alone and GF-2726 + tank mix additives was not included in the report. Data should be included to verify the results of statistical analyses. [Note: A separate submission of AGDISP input files is helpful during the review process]

- The raw data of the Sympatec instrument outputs suggest that the x-ray diffraction analyses were performed on three separate dates (*i.e.* 11-19-2015, 11-15-2015 and 11-13-2015). It is not transparent in the submitted study whether the t-tests of AGDISP deposition for the reference solution (GF-2725) and the candidate tank mix additives were compared for each day.

- Table 4 in the study report provides only one set of measured Dv_{10}, Dv_{50}, Dv_{90} (Dv = Droplet Volume) but it is not clear whether the measurements of Dv_{10}, Dv_{50}, Dv_{90} for the standard nozzle set (ASABE S572.1) with water was performed for each day.

All other tests related to the determination of droplet size distributions of tank mix additives containing GF-2726 formulation and GF-2726 solo were conducted in an enclosed spray chamber with a downdraft system. The deposition profiles of GF-2726, as well as tank mix additives in combination with GF-2726 formulation were generated using droplet spectra and the AGDISP (v8.26) model.

The results of the reviews are shown in the Table 1 below. The evaluation of nine tank mix additives is provided in a single Data Evaluation Record (DER). Additional deficiencies and reviewer's comments can be found in the study DER.

Table 1: Reviews of the Compatibility of Tank Mix Additives for GF-2726 (Enlist Duo) Formulation

Guideline #[A]	Data Requirement	MRID #	Deficiency	Study Classification
Not applicable	Characterization of the Spray Performance with Enlist Duo- WC-2015	49615001	No major deficiency but result is inconclusive.	No Decision
	Characterization of the Spray Performance with Enlist Duo- 43 tank mix additives	49876701	See narrative above	**Unacceptable** as is but **upgradeable** if resubmitted with the raw data and the deficiencies addressed
	Characterization of the Spray Performance with Enlist Duo- Fixate	49876702	No major deficiency	Acceptable/non-guideline
	Characterization of the Spray Performance with Enlist Duo- InterLock	49876703	No major deficiency	Acceptable/non-guideline
	Characterization of the Spray Performance with Enlist Duo-Liberate	49876704	No flow rate measurement	Acceptable/non-guideline

Table 1: Reviews of the Compatibility of Tank Mix Additives for GF-2726 (Enlist Duo) Formulation				
Guideline #[A]	**Data Requirement**	**MRID #**	**Deficiency**	**Study Classification**
	Characterization of the Spray Performance with Enlist Duo-PowerShot!	49876705	No major deficiency	Acceptable/non-guideline
	Characterization of the Spray Performance with Enlist Duo-R11	49876706	Density of R-11 missing	Acceptable/non-guideline
	Characterization of the Spray Performance with Enlist Duo-Request	49876707	No major deficiency	Acceptable/non-guideline
	Characterization of the Spray Performance with Enlist Duo- Savvy	49876708	No flow rate measurement	Acceptable/non-guideline
	Characterization of the Spray Performance with Enlist Duo- Woodside	49876709	No major deficiency	Acceptable/non-guideline
[A] No specific regulatory guideline is available for this testing. The testing was performed according to the testing protocol specified in the submitted studies based on the concurrence with the GF-2726 Notice of Registration[1].				

[1] USEPA (2014) Notice of Registration, EPA Registration Number 62719-649. US Government docket EPA-HQOPP- 2014-0195-2416; 15-November-2014.

Request Test material:
Common name: 2,4-D and glyphosate
Chemical name: 2,4-D and glyphosate

MRID 49615001, 4987602-09

EPA PC Code 051505

OCSPP Guideline: Not applicable
OECD Data Point: Not applicable

Primary Reviewer: Faruque Khan, Senior Scientist, EFED, ERB1

Date: 08-04-2016

Secondary Reviewer: Charles Peck, Environmental Engineer, EFED, ERB4

Date: 08-04-2016 2016.08.04 21:16:52 -04'00'

Droplet Size Characterization and AGDISP Model Deposition Analyses for Various Tank Mix Additives for Enlist Duo (GF-2726) Formulation

Reports:

MRID 49615001. Havens, P.L. and K. Sheridan. 2015. Characterization of the Spray Performance of Additive Tank Mixes with Enlist™ Herbicides – WC-2015 – Updated Report. Unpublished study performed by Dow AgroSciences LLC. Actives to Products Research and Development, Dow AgroSciences LLC, Indianapolis, IN 46268. Study ID: WC-2015-002. Experiment initiation 01/01/2015 and completion 05/01/2015. 73 pages. (p. 3).

MRID 49876702. Havens, P.L. and M. Jung. 2015. Characterization of the Spray Performance of Additive Tank Mixes with Enlist™ Herbicides - Fixate. Unpublished Report. Unpublished study performed by Dow AgroSciences LLC. Actives to Products Research and Development, Dow AgroSciences LLC, Indianapolis, IN 46268. Study ID: Fixate-2016-001. Experiment initiation 01/01/2015 and completion 04/13/2015. 50 pages. (p. 3).

MRID 49876703. Havens, P.L. and M. Jung. 2016. Characterization of the Spray Performance of Additive Tank Mixes with Enlist™ Herbicides – InterLock. Unpublished Report. Unpublished study performed by Dow AgroSciences LLC. Actives to Products Research and Development, Dow AgroSciences LLC, Indianapolis, IN 46268. Study ID: Interlock-2016-001. Experiment initiation 01/01/2015 and completion 03/10/2016. 50 pages. (p. 3).

MRID 49876704. Havens, P.L. and M. Jung. 2016. Characterization of the Spray Performance of Additive Tank Mixes with Enlist™ Herbicides – Liberate. Unpublished study performed by Dow AgroSciences LLC. Actives to Products Research and Development, Dow AgroSciences LLC, Indianapolis, IN 46268. Study ID: Liberate-2016-001. Experiment initiation 01/01/2015 and completion 03/10/2016. 50 pages. (p. 3).

MRID 49876705. Havens, P.L. and M. Jung. 2016. Characterization of the Spray Performance of Additive Tank Mixes with Enlist™ Herbicides – PowerShot!. Unpublished study performed by Dow AgroSciences LLC. Actives to Products Research and Development, Dow AgroSciences LLC, Indianapolis, IN 46268. Study ID: Powershot!-2016-001. Experiment initiation 01/01/2015 and completion 03/10/2016. 50 pages. (p. 3).

MRID 49876706. Havens, P.L. and M. Jung. 2016. Characterization of the Spray Performance of Additive Tank Mixes with Enlist™ Herbicides – R-11. Unpublished study performed by Dow AgroSciences LLC. Actives to Products Research and Development, Dow AgroSciences LLC, Indianapolis,

IN 46268. Study ID: R-11-2016-001. Experiment initiation 01/01/2015 and completion 03/10/2016. 50 pages. (p. 3).

MRID 49876707. Havens, P.L. and M. Jung. 2016. Characterization of the Spray Performance of Additive Tank Mixes with Enlist™ Herbicides – Request. Unpublished study performed by Dow AgroSciences LLC. Actives to Products Research and Development, Dow AgroSciences LLC, Indianapolis, IN 46268. Study ID: Request-2016-001. Experiment initiation 01/01/2015 and completion 03/10/2016. 50 pages. (p. 3).

MRID 49876708. Havens, P.L. and M. Jung. 2016. Characterization of the Spray Performance of Additive Tank Mixes with Enlist™ Herbicides – Savvy. Unpublished study performed by Dow AgroSciences LLC. Actives to Products Research and Development, Dow AgroSciences LLC, Indianapolis, IN 46268. Study ID: Savvy-2016-001. Experiment initiation 01/01/2015 and completion 03/10/2016. 50 pages. (p. 3).

MRID 49876709. Havens, P.L. and M. Jung. 2016. Characterization of the Spray Performance of Additive Tank Mixes with Enlist™ Herbicides – Woodside. Unpublished study performed by Dow AgroSciences LLC. Actives to Products Research and Development, Dow AgroSciences LLC, Indianapolis, IN 46268. Experiment initiation 01/01/2015 and completion 03/10/2016. 50 pages. (p. 3).

Document No.: MRIDs 49615001, , 49877602, 49876703, 49876704, 49876705, 49876706, 49876707 49876708 and 498767009

Guideline: Not applicable

Statements: This method was not conducted according USEPA GLP Standards. Signed and dated statements of Data Confidentiality, Quality Assurance, and GLP were provided (pp. 4).

Classification: The Agency finds that all the tank mix additives meet the criteria for a scientifically valid study and provide **acceptable/non-guideline** information except WC-2015. The results for tank mix WC-2015 additive were inconclusive.

PC Code: 051505

Reviewer: Faruque Khan, Senior Scientist, EFED, ERB1 Faruque A. Khan

Signature: **Date: 08-04-2016**

EXECUTIVE SUMMARY

Nine tank mix additive materials were proposed as potential additives for Enlist Duo herbicide (GF-2726) by the Dow AgroScience LLC. It is critical to perform sufficient evaluations to ensure that the tank mix additives are compatible with the GF-2726 formulation with respect to droplet size spectra so that the potential for spray drift is not compromised by tank mix additives beyond the bench mark 30 ft downwind deposition. In conformance with regulatory requirements for the addition of tank mix additives to spray tank containing GF-2726, nine separate studies were conducted in a spray chamber for GF-2726 alone and candidate tank mix additives with GF-2726. None of the candidate tank mix additives, except WC-2015, when used in combination with GF-2726 herbicide, exceeded the threshold spray drift deposition at 30 ft for the theoretical drift control performance of GF-2726. Since the deposition results of the candidate tank mix WC-2015 for the day 1 test were higher than GF-2726 alone, but lower in day 2, the performance of WC-2015 was regarded as inconclusive.

A. BACKGROUND INFORMATION

The emission droplet size spectrum formed by the atomization of a pesticide is affected by many application conditions (nozzle type, pressure, etc.) and physical properties of tank mix (*e.g.* dynamic surface tension, viscosity etc.). Several studies were conducted, measuring droplet size distributions (DSDs), to determine the potential effects of various spray tank mix additives to spray atomization and subsequent potential spray drift deposition of a standalone application of GF-2726 with an Air Induction Extended Range 11004 (AIXR 11004) nozzle at 40 psi.

Droplet size distribution is a critical input parameter for spray drift modeling programs, such as AgDRIFT and AGDISP, which can estimate potential deposition profiles using the aDSD and other application parameters specific to a pesticide application. The AGDISP model was used to estimate the downwind deposition at 30 ft for the proposed tank mix additives. The deposition value was compared to the mean of 30 ft estimated deposition for GF-2726 alone. In order for the proposed tank mix additive to be considered acceptable, the downwind deposition must be statistically equal to or lower than the mean of 30 ft estimated deposition for GF-2726 alone.

B. Materials and Methods

All the tests related to determination of DSD of tank mix additives containing GF-2726 formulation and GF-2726 solo were conducted in an enclosed spray chamber with downdraft system. No specific regulatory guideline is available for this testing. Therefore, the testing was performed according to the testing protocol specified in Appendix A of the submitted studies based on the concurrence with the GF-2726 Notice of Registration[1].

Test Substance

Reference Substances:

[1] USEPA (2014) Notice of Registration, EPA Registration Number 62719-649. US Government docket EPA-HQOPP- 2014-0195-2416; 15-November-2014.

Commercial GF-2726 Herbicide (formulation code GF-2726, EPA registration number 62719-649) was used as reference substance. The formulation contains 22.1% glyphosate dimethylammonium salt (17.48% acid equivalent, 1.7 lbs/gal) and 24.4% 2,4-D choline salt (16.62% acid equivalent, 1.6 lbs/gal).

Candidate Tank Mix Additives:

Nine candidate additive materials were used to characterize the performance of tank mixes with GF-2726 formulation. Since these additives are proprietary mixture, the exact composition of the additives are not known. The following tank mix additives (**Table 1**) were used to evaluate the potential effects on spray atomization and subsequent spray drift deposition. This table also provides the densities of tank mix additives and the suggested volume/volume composition of the tank mixes with the GF-2726 formulation.

Table 1. Density and Volume compositions of Tank Mix Additives

MRID #s	Tank Mix Additive	Density	Volume additive/volume GF-2726 Composition (%/%)	Reference
49615001	WC-2015	1.253	0.25/2.8	Page 29 of Submitted study
49876702	Fixate	1.30	0.50/2.92	Page 27 of Submitted studies
49876703	InterLock	0.879	0.20/2.92	
49876704	Liberate	0.976	0.25/2.92	
49876705	PowerShot!	0.970	0.20/2.92	
49876706	R-11	NA	0.24/2.92	
49876707	Request	1.253	0.25/2.92	
49876708	Savvy	0.95	0.50/2.92	
49876709	Woodside	0.90	0.50/2.92	

Preparation of spray solution and Generating Drop Size Distribution.

The spray mixtures utilized WHO 342 ppm (as $CaCO_3$) synthetic standard hardness water, which was prepared by the addition of reagent-grade calcium chloride and magnesium chloride hexahydrate to laboratory deionized water. GF-2726 spray solutions were prepared in 1.5L batches by adding the calculated volumes of GF-2726 formulation to calculated volumes of synthetic water. Solutions containing candidate additives were prepared by adding the additive to the GF-2726/water solution. As specified in the testing protocol (Appendix A of the submitted studies) volume fractions of 2.8% v/v and 2.92% v/v solutions of GF-2726 formulation were tested with the tank mixes additive(s) at the volume composition(s) shown in **Table 2**.

Table 2. Fractions non-volatile and active ingredient for reference and various reference + tank mixes additives solutions

MRID	Tank Mixes	Volume/Volume Composition	Volume Fractions[A]	
			Non-Volatiles	Active Ingredients
49615001	GF-2726	2.8% GF-2726 in WHO 342 ppm synthetic hardness water	0.01520	0.00543
	GF-2726 + WC-2015	2.8% GF-2726 + 0.25% WC-2015 in WHO 342 ppm synthetic hardness water	0.01831	0.00543
49876702	GF-2726	2.92% GF-2726 in WHO 342 ppm synthetic hardness water	0.01585	0.00566
	GF-2726 + Fixate	2.92% GF-2726 + 0.5% Fixate in WHO 342 ppm synthetic hardness water	0.02229	0.00566
49876703	GF-2726	2.92% GF-2726 in WHO 342 ppm synthetic hardness water	0.01585	0.00566
	GF-2726 + InterLock	2.92% GF-2726 + 0.20% InterLock in WHO 342 ppm synthetic hardness water	0.01760	0.00567
49876704	GF-2726	2.92% GF-2726 in WHO 342 ppm synthetic hardness water	0.01585	0.00566
	GF-2726 + Liberate	2.92% GF-2726 + 0.25% Liberate in WHO 342 ppm synthetic hardness water	0.01828	0.00567
49876705	GF-2726	2.92% GF-2726 in WHO 342 ppm synthetic hardness water	0.01585	0.00566
	GF-2726 + PowerShot!	2.92% GF-2726 + 0.20% PowerShot! in WHO 342 ppm synthetic hardness water	0.01778	0.00567
49876706	GF-2726	2.92% GF-2726 in WHO 342 ppm synthetic hardness water	0.01585	0.00566
	GF-2726 + R-11	2.92% GF-2726 + 0.24% R-11 in WHO 342 ppm	0.01589	0.00568

MRID	Tank Mixes	Volume/Volume Composition	Volume Fractions[A]	
			Non-Volatiles	Active Ingredients
		synthetic hardness water		
49876707	GF-2726	2.92% GF-2726 in WHO 342 ppm synthetic hardness water	0.01585	0.00566
	GF-2726 + Request	2.92% GF-2726 + 0.25% Request in WHO 342 ppm synthetic hardness water	0.01896	0.00566
49876708	GF-2726	2.92% GF-2726 in WHO 342 ppm synthetic hardness water	0.01585	0.00566
	GF-2726 + Savvy	2.92% GF-2726 + 0.5% Savvy in WHO 342 ppm synthetic hardness water	0.02058	0.00567
49876709	GF-2726	2.92% GF-2726 in WHO 342 ppm synthetic hardness water	0.01585	0.00566
	GF-2726 + Woodside	2.92% GF-2726 + 0.50% Woodside in WHO 342 ppm synthetic hardness water	0.02034	0.00567

[A] Example Calculations:
The tested mixture was 2.8% (v/v) GF-2726 in water. GF-2726 has a density of 1.171 kg/L and contains 24.42 % (w/w) of 2,4-D choline salt (16.65% (w/w) 2,4-D acid equivalent) and 22.17% (w/w) glyphosate dimethylammonium salt.

For example, a 100-liter batch would contain the following:
GF-2726 2.8% * 100 L = 2.8L; 2.8L * 1.171 kg/L = 3.279 kg
Water: 100 -2.8 L = 97.2 L = 97.2 kg
Total weight: 3.279+97.2 = 100.497 kg

Active ingredient fraction:
3.279 kg * 16.65 % (a.e.) = 0.546 kg; 0.546 kg/100.497 kg = **0.0054** (dimensionless)

Non-volatile fraction:
Reference Solution-3.279 kg* (24.42 % + 22.17%) = 1.528 kg; 1.528 kg/100.497 kg = **0.0152** (dimensionless)

All solutions were sprayed through a TeeJet Air Induction Extended Range (AIXR) 11004 spray nozzle (Spraying Systems, Inc., Wheaton, IL) at a nominal pressure of 40 psi. Experimental conditions are summarized in **Table A-1** for each study (**Appendix A**). To establish the baseline droplet spectra, a 2.80% v/v (for WC-2015) or 2.92% (v/v for all other tank mix additives

solutions) of the GF-2726 formulation was tested after the first and before the final water spray for each testing day.

To calibrate flow rate of 0.4 gallons per minute, the spray pressure at the sprayer controller unit was set slightly higher (49 psi) than the target pressure, giving a pressure of 40 psi at the spray nozzle (as measured by the in-line analog pressure gauge near the nozzle). By measuring spray volumes collected over 10-second periods, the pressure was adjusted to obtain the desired flow rate.

The Sympatec Helos/KF particle size analyzer fitted with an R7 lens with capability of detecting droplets in a range from 0.5 to 3500 µm was used to characterize the drop size spectra. All measurements were made across the beamline at 12 inches down from the nozzle outlet orifice with linear actuator to collect the complete DSD of the spray pattern. The droplet size spectra were measured in the stable air flow system of the spray chamber. The purpose of sufficient air flow to keep the small drops moving forward and to prevent them from swirling back and being measured multiple times. Data were collected at a 100 milliseconds (ms) frequency during the scan across the spray pattern, with beginning and ending triggers of 0.1% obscurations in channel (86 µm). Diffraction readings were then integrated into the final spectrum by the instrument software. The spectrum results were saved in the internal Sympatec database.

AGDISP Modeling of Potential Spray Drift Deposition.

The deposition profile for each replicate test of GF-2726, as well as tank mix additives in combination with GF-2726 formulation, were generated using droplet spectra and AGDISP (v8.26) model. The key inputs and example AGDISP model output were included in the Appendices C of the submitted studies. All inputs, except for the droplet spectra and volatile/non-volatile fractions, were kept constant for all of the simulations. Droplet spectra inputs and outputs for each model run were provided in the Appendix D of the submitted studies. Various AGDISP model inputs were selected based on a field study (MRID 48844001). As outlined in the GF-2726 Notice of Registration (see footnote 1) and the test protocol developed by the Dow AgroAcience LLC (Appendix A of the submitted studies), a one-sided upper bound t-test was performed on the modeled deposition at 30 feet downwind as a comparison metric for the additive-containing mixtures versus sprays of GF-2726 formulation alone.

C. RESULTS AND DISCUSSION

Environmental conditions such as temperature and humidity, as well as air velocities, are shown in the **Table A-1** of each studies. The droplet size spectra were measured in the stable air flow system of the spray chamber. The air flow velocities ranged from 320 fpm (ft per minute) [3.64 mph (miles per hour] to 363 fpm [4.13 mph] for these studies. The air speed variabilities were 1 to 8% during the experiments that were conducted for each day and were within the Agency's standards for the DRT protocol (USEPA 2016).

The spray droplet distribution analysis results for solo GF-2726 formulation and each tank mix additives in combination of GF-2726 formulation were summarized in Table 1 in the Appendix

C of the submitted study reports. Examples of Sympatec particle size analysis and spray droplet distribution analysis results are included in **Appendix B**.

Deposition profiles for solo GF-2726 and tank mix additives with GF-2726 formulation were generated using AGDISP (v8.26) model. Selected AGDISP input values were based on a field study (MRID 48844001). The modeled mean depositions and statistical results at the 30-ft benchmark distance are presented in the **Table 3**. The output data sets from AGDISP were read into R (R Foundation for Statistical Computing, Vienna, Austria). The function interpSpline from library (splines) was used to interpolate the 30 ft. estimated deposition of spray drift fractions for each replication using a spline function fit to the data (**Tables D-1** through **D-9** in the **Appendix D**). A *p*-value less than 0.1 for one-tail upper bound t-test statistical significance was adopted based on the GF-2726 Notice of Registration. The function t-test from library (stats) was used to perform Welch's t-test assuming unequal variances by the study authors (in page18 of the submitted studies). A student t-test, assuming unequal variance, was also performed by the reviewer to confirm reported results in the submitted studies. Statistical results in **Table 3** were determined by the study reviewer. The depositions of candidate tank mix additives except WC-2015 in combination with GF-2726 were statistically less than or equal to GF-2726 alone. The deposition results of candidate tank mix WC-2015 for day 1 test was higher than GF-2726 alone but lower in day 2. Thus the deposition results were inconclusive to determine the performance of the WC-2015 additive.

Table 3. AGDISP Modeled Mean Deposition of GF-2726 Solo and GF-2726 in combination with Various Tank Mix Additives and the Results of T-test

Date	MRID #	Tank Mix Additive ID.	# of Replication	Mean (*SD*[A])	*p*-value @ $\alpha = 0.1$	Results	Conclusion
Reference (GF-2726)							
04/27/2015	49615001	NA[B]	6	0.03827 (*0.0013*)	NA	NA	NA
04/28/2015	49615001	NA	6	0.03888 (*0.0010*)	NA	NA	NA
3/03/2915	49876702	NA	6	0.03910 (*0.0004*)	NA	NA	NA
02/172015	49876703	NA	6	0.04018 (*0.0015*)	NA	NA	NA
01/27/2015	49876704	NA	6	0.03930 (*0.0009*)	NA	NA	NA
01/29/2015	49876705	NA	6	0.04000 (*0.0013*)	NA	NA	NA
02/17/2015	49876706	NA	6	0.03930 (*0.0009*)	NA	NA	NA
01/29/2015	49876707	NA	6	0.04000 (*0.0013*)	NA	NA	NA
01/27/2015	49876708	NA	6	0.03930 (*0.0009*)	NA	NA	NA
01/27/2015	49876709	NA	6	0.03960 (*0.0009*)	NA	NA	NA
GF-2726 + Tank Mix Additive							

04/27/2015	49615001	WC-2015	3	0.0397 (*0.0008*)	0.04	Higher Deposition	Inconclusive
04/28/2015			3	0.0381 (*0.0011*)	0.18	≤ Deposition	
3/03/2915	49876702	Fixate	3	0.0404 (*0.0020*)	0.18	≤ Deposition	Acceptable
02/172015	49876703	InterLock	3	0.0389 (*0.0006*)	0.05	≤ Deposition	Acceptable
01/27/2015	49876704	Liberate	3	0.0356 (*0.0016*)	0.02	≤ Deposition	Acceptable
01/29/2015	49876705	PowerShot!	3	0.0404 (*0.0021*)	0.40	≤ Deposition	Acceptable
02/17/2015	49876706	R-11	3	0.0366 (*0.0018*)	0.07	≤ Deposition	Acceptable
01/29/2015	49876707	Request	3	0.0400 (*0.0021*)	0.40	≤ Deposition	Acceptable
01/27/2015	49876708	Savvy	3	0.0366 (*0.0018*)	0.07	≤ Deposition	Acceptable
01/27/2015	49876709	Woodside	3	0.0379 (*0.0009*)	0.03	≤ Deposition	Acceptable

[A] Standard Deviation
[B] NA Not Applicable

To measure the reproducibility of the test system over the duration of the testing, AIXR 11004 nozzle was tested with deionized water. Droplet size spectra of the AIXR 11004 nozzle were performed at the beginning of each testing day, as well as at the conclusion of testing. The instrument performance test results, based on the water sprays and the beginning and end of the testing day, are shown in **Tables F-1 to F-9** in **Appendix F**. Based upon Dv0.5 and % fines, instrument performance was within 10% of the coefficient variations over the testing periods, which is within the Agency's 10% standard deviation around mean diameter for replicate measurements according to the DRT protocol (USEPA 2016)[2].

D. ACCEPTABILITY/DEFICIENCIES/CLARIFICATIONS

Analytical data for tested nozzles were submitted, so reviewers were able to confirm the reported drop size distribution and statistical analysis. This study is classified as acceptable, with no major deficiencies. However, the following inconsistencies were noted.

- Commercial GF-2726 Herbicide (formulation code GF-2726, EPA registration number 62719-649) of Dow AgroSciences Sample Management, Lot 3 18163R01 was used in the evaluation performance of various tank mix additives. The formulation contains 22.1% glyphosate dimethylammonium salt (17.48% acid equivalent, 1.7 lbs/gal) and 24.4% 2,4-D choline salt (16.62% acid equivalent, 1.6 lbs/gal). However, the volume fraction of 2.92% of GF-2726 was used for all tank mix additives except WC-2015 in calculating volatile/non-volatile fractions for AGDISP modeling. A volume fraction of 2.8% v/v was used for WC-2015 in calculating volatile/non-volatile fractions. No explanation was provided for this inconsistency.

[2] https://www.epa.gov/reducing-pesticide-drift/generic-verification-protocol-testing-pesticide-application-spray-drift

- For WC-2015, a t-test was performed using combined DSD data collected from two different days. Comparisons between the deposition profile of GF-2726 alone and WC-2015 tank mix additive should have performed independently for each day.

- Density of R-11 is not available in the study report. Therefore, there is an uncertainty in estimating volatile/non-volatile and active fractions for tank mix additive R-11, an important input parameter for AGDISP modeling.

- Flow rate measurements were not reported for MRID 49876704 and MRID 49876708.

- To measure the DSD reproducibility of the test system over the duration of the testing, an AIXR 11004 nozzle with deionized water was used instead of ASABE reference nozzles. It is preferable to use ASABE reference nozzles for quality control and quality assurances standards.

E. CONCLUSIONS

None of the candidate tank mix additives, except WC-2015, when used in combination with GF-2726 herbicide, exceeded the threshold spray drift deposition at 30 ft for the theoretical drift control performance of GF-2726. Since the deposition results of candidate tank mix WC-2015 for day 1 test was higher than GF-2726 alone but lower in day 2, the performance of WC-2015 was regarded as inconclusive. The Agency finds that all the tank mix additives meet the criteria for a scientifically valid study and provide **acceptable** information except WC-2015.

Appendix A

A-1. WC-2015

Table A-1.1 Experimental Conditions (MRID 49615001, Page 16)

	Testing 27-apr-2015		Testing 28-apr-2015	
	Beginning of testing day	End of testing day	Beginning of testing day	End of testing day
Nozzle model and internal tracking number	AIXR11004_10	AIXR11004_10	AIXR11004_10	AIXR11004_10
Time	10:36 AM	11:41 AM	9:37 AM	1:31 PM
Temperature	72.9F	72.7F	71.79 F	72.24 F
Air Flow	332 fpm	339 fpm	320 fpm	324 fpm
Humidity	26.9% RH	26.8% RH	28.6% RH	26.1% RH
Spray pressure setting	49.6 psi	49.6 psi	49.6 psi	49.6 psi

Table A-1.2 Flowrate Calibration (MRID 49615001, Page 16)

Measurement number	Flow rate measurements (mL/10 sec)	Flow rate in gallons per minute
Testing 27-apr-2015		
1	251.9	0.3993
2	252.8	0.4007
3	252.6	0.4004
Testing 28-apr-2015		
1	252.5	0.4002
2	252.4	0.4001
3	252.5	0.4002
Overall mean	252.5	0.4001
Overall standard deviation	0.21	0.0005 (0.13% of nominal)

Table A-1.3. Pressure Gauge Records (MRID 49615001, Page 17)

	Gauge pressure, psi			
Tank Mix	Rep1	Rep2	Rep3	Measurement Numbers used
Testing 27-apr-2015				
DI Water	40	39	39	1.2.3
GF-2726	40	40	40	3.4.6
GF-2726+WC-2015	39	39	39	4.5.6
GF-2726	39	39	39	2.3.4
DI Water	39	39	39	1.2.3
Testing 28-apr-2015				
DI Water	39	39	39	3.5.6
GF-2726	39	39	39	1.2.3
GF-2726+WC-2015	39	39	39	3.6.9
GF-2726	39	39	39	1.2.3
DI Water	39	39	39	2.3.4

A-2. Fixate

Table A-2.1 Experimental Conditions (MRID 49876702, Page 16)

Date 03-Mar-2015	Beginning of testing day	End of testing day
Nozzle model and internal tracking number	AIXR11004_10	AIXR11004_10
Time	9:09 AM	2:53 PM
Temperature	72.9 F	71.2 F
Air Flow	324 fpm (3.68 mph)	356 fpm (4.05 mph)
Humidity	16.8% RH	31.89% RH
Spray pressure setting	49.6 psi	49.6 psi

Table A-2.2 Flowrate Calibration (MRID 49876702, Page 16, Page 16)

Measurement number	Flow rate measurements (mL/10 sec)	Flow rate in gallons per minute
1	252.6	0.4004
2	252.8	0.4007
3	252.4	0.4001
mean	252.6	0.4004
Standard deviation	0.16	0.0003 (0.075% of nominal)

Table A-2.3 Pressure Gauge Records (MRID 49876702, Page 16)

	Gauge pressure, psi			
Tank Mix	Rep1	Rep2	Rep3	Measurement Numbers used
DI Water	40	40	40	1, 2, 3
GF-2726	40	40	40	1, 2, 3
GF-2726+Fixate	40	40	40	3, 4, 5
GF-2726	40	40	40	1, 2, 3
DI Water	40	40	40	1, 2, 3

A-3. InterLock

Table A-3.1 Experimental Conditions (MRID 49876703, Page 16)

Date 17-Feb-2015	Beginning of testing day	End of testing day
Nozzle model and internal tracking number	AIXR11004_10	AIXR11001_10
Time	8:56 AM	2:29 PM
Temperature	71.33 F	70.50 F
Air Flow	341 fpm (3.88 mph)	333 fpm (3.78 mph)
Humidity	10.19% RH	13.43% RH
Spray pressure setting	49.7 psi	49.7 psi

Table A-3.2 Flow rate Calibration (MRID 49876703, Page 16)

Measurement number	Flow rate measurements (mL/10 sec)	Flow rate in gallons per minute
1	252.6	0.4004
2	252.4	0.4001
3	252.4	0.4001
mean	252.5	0.4001
Standard deviation	0.09	0.0001 (0.025% of nominal)

Table A-3.3 Pressure Gauge Records (MRID 4987603, Page 17)

	Gauge pressure, psi			
Tank Mix	Rep1	Rep2	Rep3	Measurement Numbers used
DI Water	40	40	40	1, 2, 3
GF-2726	40	40	40	2, 3, 4
GF-2726+InterLock	40	40	40	1, 2, 3
GF-2726	40	40	40	1, 2, 3
DI Water	40	40	40	1, 2, 3

A-4. Liberate

Table A-4.1 Experimental Conditions (MRID 49876704, Page 16)

Date 27-Jan-2015	Beginning of testing day	End of testing day
Nozzle model and internal tracking number	AIXR11004_10	AIXR11004_10
Time	8:09 AM	10:40 AM
Temperature	72.8 F	71.2 F
Air Flow	351 fpm (3.99 mph)	363 fpm (4.13 mph)
Humidity	27.07% RH	25.15% RH
Spray pressure setting	49.8 psi	49.8 psi

Flow rate measurement was not recorded for this study (MRID 4987604, Page 16)

Table A-4.3 Pressure Gauge Records (MRID 4987604, Page 17)

	Gauge pressure, psi			
Tank Mix	Rep1	Rep2	Rep3	Measurement Numbers used
DI Water	40	40	40	1, 3, 4
GF-2726	40	40	40	1, 2, 4
GF-2726+Liberate	40	40	40	1, 2, 4
GF-2726	40	40	40	2, 4, 5
DI Water	40	40	40	1, 2, 4

A-5. Powershot!

Table A-5.1 Experimental Conditions (MRID 4987605, Page 16)

Date 29-Jan-2015	Beginning of testing day	End of testing day
Nozzle model and internal tracking number	AIXR11004_10	AIXR11001_10
Time	10:01 AM	2:38 PM
Temperature	71.5 F	71.6 F
Air Flow	345 fpm (3.92 mph)	341 fpm (3.88 mph)
Humidity	27.07% RH	25.15% RH
Spray pressure setting	49.6 psi	49.6 psi

Table A-5.2 Flowrate Calibration (MRID 49876705, Page 16)

Measurement number	Flow rate measurements (mL/10 sec)	Flow rate in gallons per minute
1	252.9	0.4009
2	252.5	0.4002
3	252.6	0.4004
mean	252.7	0.4005
Standard deviation	0.21	0.0003 (0.075% of nominal)

Table A-5.3 Pressure Gauge Records (MRID 49876705, Page 17)

	Gauge pressure, psi			
Tank Mix	Rep1	Rep2	Rep3	Measurement Numbers used
DI Water	40	40	40	1, 2, 3
GF-2726	40	40	40	1, 4, 5
GF-2726+PowerShot!	40	40	40	1, 2, 3
GF-2726	40	40	40	1, 2, 4
DI Water	40	40	40	2, 3, 4

A-6. R-11

Table A-6.1 Experimental Conditions (MRID 49876706, Page 16)

Date 17-Feb-2015	Beginning of testing day	End of testing day
Nozzle model and internal tracking number	AIXR11004_10	AIXR11001_10
Time	8:56 AM	2:29 PM
Temperature	71.3 F	70.5 F
Air Flow	341 fpm (3.88 mph)	333 fpm (3.78 mph)
Humidity	10.19% RH	13.43% RH
Spray pressure setting	49.7 psi	49.7 psi

Table A-6.2 Flowrate Calibration (MRID 49876706, Page 16)

Measurement number	Flow rate measurements (mL/10 sec)	Flow rate in gallons per minute
1	252.6	0.4004
2	252.4	0.4001
3	252.4	0.4001
mean	252.5	0.4002
Standard deviation	0.09	0.0001 (0.025% of nominal)

Table A-6.3 Pressure Gauge Records (MRID 49876706, Page 17)

	Gauge pressure, psi			
Tank Mix	Rep1	Rep2	Rep3	Measurement Numbers used
DI Water	40	40	40	1, 2, 3
GF-2726	40	40	40	2, 3, 4
GF-2726+R-11	40	40	40	1, 2, 3
GF-2726	40	40	40	1, 2, 3
DI Water	40	40	40	1, 2, 3

A-7. Request

Table A-7.1 Experimental Conditions (MRID 49876707, Page 16)

Date 29-Jan-2015	Beginning of testing day	End of testing day
Nozzle model and internal tracking number	AIXR11004_10	AIXR11001_10
Time	10:01 AM	2:38 PM
Temperature	71.5 F	71.6 F
Air Flow	345 fpm (3.92 mph)	341 fpm (3.88 mph)
Humidity	27.07% RH	25.15% RH
Spray pressure setting	49.6 psi	49.6 psi

Table A-7.2 Flowrate Calibration (MRID 4987607, Page 16)

Measurement number	Flow rate measurements (mL/10 sec)	Flow rate in gallons per minute
1	252.9	0.4009
2	252.5	0.4002
3	252.6	0.4004
mean	252.7	0.4005
Standard deviation	0.21	0.0003 (0.075% of nominal)

Table A-7.3 Pressure Gauge Records (MRID 49876707, Page 17)

	Gauge pressure, psi			
Tank Mix	Rep1	Rep2	Rep3	Measurement Numbers used
DI Water	40	40	40	1, 2, 3
GF-2726	40	40	40	1, 4, 5
GF-2726+Request	40	40	40	1, 2, 3
GF-2726	40	40	40	1, 2, 4
DI Water	40	40	40	2, 3, 4

A-8. Savvy

Table A-8.1 Experimental Conditions (MRID 49876708, Page 16)

Date 27-Jan-2015	Beginning of testing day	End of testing day
Nozzle model and internal tracking number	AIXR11004_10	AIXR11004_10
Time	8:09 AM	10:40 PM
Temperature	72.8 F	71.2 F
Air Flow	351 fpm (3.99 mph)	363 fpm (4.13 mph)
Humidity	17.23% RH	13.53% RH
Spray pressure setting	49.8 psi	49.8 psi

Flow rate measurement was not recorded for this study (MRID 4987608, Page 16)

Table A-8.3 Pressure Gauge Records (MRID 49876708, Page 17)

	Gauge pressure, psi			
Tank Mix	Rep1	Rep2	Rep3	Measurement Numbers used
DI Water	40	40	40	1, 3, 4
GF-2726	40	40	40	1, 2, 4
GF-2726+Savvy	40	40	40	1, 2, 3
GF-2726	40	40	40	2, 4, 5
DI Water	40	40	40	1, 2, 4

A-9. Woodside

Table A-9.1 Experimental Conditions (MRID 49876709, Page 16)

Date 28-Jan-2015	Beginning of testing day	End of testing day
Nozzle model and internal tracking number	AIXR11004_10	AIXR11004_10
Time	9:31 AM	2:17 PM
Temperature	71.3 F	71.7 F
Air Flow	345 fpm (3.92 mph)	335 fpm (3.81 mph)
Humidity	13.15% RH	13.32% RH
Spray pressure setting	49.6 psi	49.6 psi

Table A-9.2 Flowrate Calibration (MRID 49876709, Page 16)

Measurement number	Flow rate measurements (mL/10 sec)	Flow rate in gallons per minute
1	252.8	0.4007
2	252.4	0.4001
3	252.3	0.3999
mean	252.5	0.4002
Standard deviation	0.22	0.0004 (0.087% of nominal)

Table A-9.3 Pressure Gauge Records (MRID 49876709, Page 17)

	Gauge pressure, psi			
Tank Mix	Rep1	Rep2	Rep3	Measurement Numbers used
DI Water	40	40	40	1, 2, 3
GF-2726	40	40	40	1, 2, 3
GF-2726+Woodside	40	40	40	1, 2, 3
GF-2726	40	40	40	1, 2, 3
DI Water	40	40	40	1, 3, 5

Appendix B.

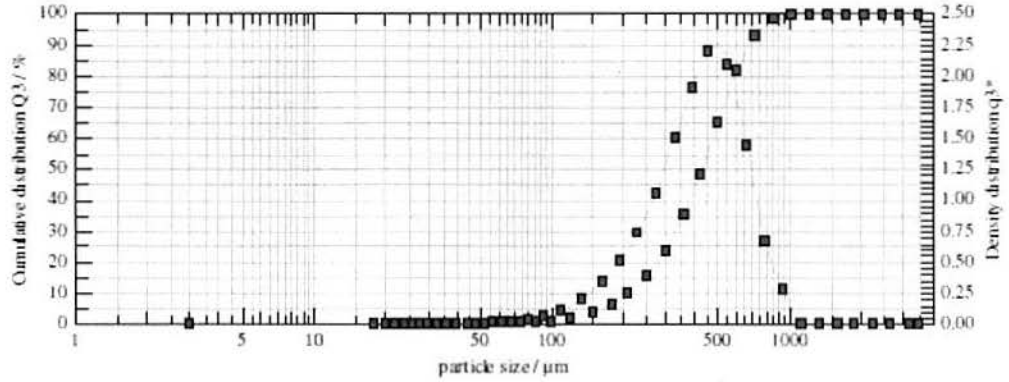
Example of Sympatec Laser particle Size Analyzer Reports (Example from MRID 49615001)

Sympatec GmbH
System-Partikel-Technik

HELOS Particle Size Analysis
WINDOX 5

HELOS (H2197) & SPRAYER, R7: 0.5/18.0...3500µm 2015-04-27, 10:43:57.158
Water

x_{10} = 211.27 µm	x_{50} = 427.85 µm	x_{90} = 688.45 µm	SMD = 353.53 µm	VMD = 441.42 µm
x_{16} = 253.78 µm	x_{84} = 624.83 µm	x_{98} = 939.42 µm	S_V = 0.02 m²/cm³	S_m = 169.72 cm²/g



comment:

user parameters:
Nozzle: AIXR11004_10
Spray Pressure: 40 psi
Sample Name: GF-2726_beginning 4-27-15

cumulative distribution

x_0/µm	Q_3/%	x_0/µm	Q_3/%	x_0/µm	Q_3/%	x_0/µm	Q_3/%
18.00	0.00	74.00	0.26	300.00	23.75	1220.00	100.00
22.00	0.00	86.00	0.50	360.00	35.58	1460.00	100.00
26.00	0.00	100.00	0.91	420.00	48.37	1740.00	100.00
30.00	0.00	120.00	1.77	500.00	65.01	2060.00	100.00
36.00	0.00	150.00	3.71	600.00	81.66	2460.00	100.00
44.00	0.00	180.00	6.41	720.00	92.97	2940.00	100.00
52.00	0.00	210.00	9.82	860.00	98.01	3500.00	100.00
62.00	0.09	250.00	15.37	1020.00	100.00		

density distribution (log.)

x_m/µm	q_3/g	x_m/µm	q_3/g	x_m/µm	q_3/g	x_m/µm	q_3/g
3.00	0.00	67.73	0.02	273.86	1.06	1115.53	0.00
19.90	0.00	79.77	0.04	328.63	1.49	1334.62	0.00
23.92	0.00	92.74	0.06	388.84	1.91	1593.86	0.00
27.93	0.00	109.54	0.11	458.26	2.20	1893.25	0.00
32.86	0.00	134.16	0.20	547.72	2.10	2251.13	0.00
39.80	0.00	164.32	0.34	657.27	1.43	2689.31	0.00
47.83	0.00	194.42	0.51	786.89	0.65	3207.80	0.00
56.78	0.01	229.13	0.73	936.59	0.27		

evaluation: WINDOX 5.8.1.0, *HRLD*
revalidation:
reference measurement: 04-27 10:43:43
contamination: 0.00 %

product: Water
density: 1.00 g/cm³
shape factor: 1.00
C_{ref}: 3.17 %

Example of Droplet Size Distributions from Sympatec Helos Output and Input parameter for AGDISP Modeling (Example from MRID 49615001)

Droplet Sizes

	Testing Day – 27-April-2015								
Droplet size, µm	Cumulative volume fraction								
	GF-2726, beginning of testing day			GF-2726, end of testing day			WC-2015		
	Rep1	Rep2	Rep3	Rep1	Rep2	Rep3	Rep1	Rep2	Rep3
18	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0
52	0	0	0	0.05	0	0	0	0.06	0.06
62	0.09	0.08	0.1	0.15	0.1	0.08	0.09	0.17	0.16
74	0.26	0.24	0.27	0.34	0.26	0.24	0.26	0.36	0.34
86	0.5	0.46	0.53	0.62	0.5	0.49	0.52	0.64	0.6
100	0.91	0.85	0.96	1.08	0.92	0.92	0.96	1.09	1.03
120	1.77	1.67	1.87	2.02	1.8	1.87	1.88	2.04	1.94
150	3.71	3.56	3.97	4.08	3.88	4.03	3.97	4.16	4.06
180	6.41	6.2	6.86	6.91	6.78	6.95	6.84	7.11	7.04
210	9.82	9.52	10.43	10.44	10.36	10.48	10.39	10.79	10.75
250	15.37	14.93	16.17	16.18	16.06	16.08	16.06	16.64	16.69
300	23.75	23.22	24.85	24.86	24.53	24.5	24.56	25.24	25.57
360	35.58	34.97	37.07	36.98	36.36	36.37	36.43	37.17	37.86
420	48.37	47.64	50.24	49.96	49.16	49.21	49.15	49.87	50.86
500	65.01	64.2	67.62	67.03	66.07	66.23	65.63	66.28	67.61
600	81.66	80.93	85.14	84.39	83.27	83.74	82.06	82.75	84.28
720	92.97	92.43	95.88	95.52	94.36	95.09	93.14	93.86	95.41
860	98.01	97.57	100	99.24	98.59	99.07	98.04	98.45	100

Droplet size, µm	Cumulative volume fraction								
	GF-2726, beginning of testing day			GF-2726, end of testing day			WC-2015		
	Rep1	Rep2	Rep3	Rep1	Rep2	Rep3	Rep1	Rep2	Rep3
1020	100	99.31	100	100	100	100	100	100	100
1220	100	100	100	100	100	100	100	100	100
1460	100	100	100	100	100	100	100	100	100
1740	100	100	100	100	100	100	100	100	100
2060	100	100	100	100	100	100	100	100	100
2460	100	100	100	100	100	100	100	100	100
2940	100	100	100	100	100	100	100	100	100
3500	100	100	100	100	100	100	100	100	100

Appendix C

AGDISP modeling parameters

Parameter	Value	Comments
Application method		
Method	Ground	
Nozzle type	Flat fan (default)	The direct use of DSD overrides the use of nozzle type
Boom pressure	40 psi	If nozzles/tank mixes were tested at 40 psi. It has to be consistent with tank mix as well as Enlist for both TeeJet and AIXR nozzles.
Release height	0.9144 m	Default
Spray lines	20	Default
Meteorology		
Wind type	Single height	Default
Wind speed	6.71 m/s	
Wind direction	-90 deg	Worst case default
Temperature	18.33 °C	Default
Relative humidity	50%	Default
Surface		
Angles	0	Default
Canopy	None	Default
Surface roughness	0.0366 m	Mean for "crops" cover type
Application technique		
Nozzles	54, even spacing	Standard boom setup
DSD	From wind tunnel results, imported in library	
Atmospheric stability	Strong	Default
Swath		
Swath width	27.43 m	Standard boom
Swath displacement	0 m	Worst case
Spray material		
Spray volume rate	140 L/ha	From GF-2726 label
Volatile/non-volatile fraction	GF-2726 at 2.8% v/v	To calculate volatile/nonvolatile fraction in the tank mix for the model input, provide detailed information of the tested formulations and tank mixes. See sample calculation below [A]

Parameter	Value	Comments
[A] Example Calculations: The tested mixture was 2.8% (v/v) GF-2726 in water. GF-2726 has a density of 1.171 kg/L and contains 24.42 % (w/w) of 2,4-D choline salt (16.65% (w/w) 2,4-D acid equivalent) and 22.17% (w/w) glyphosate dimethylammonium salt. For example, a 100-liter batch would contain the following: GF-2726 2.8% * 100 L = 2.8L; 2.8L * 1.171 kg/L = 3.279 kg Water: 100 -2.8 L = 97.2 L = 97.2 kg Total weight: 3.279+97.2 = 100.497 kg Active ingredient fraction: 3.279 kg * 16.65 % (a.e.) = 0.546 kg; 0.546 kg/100.497 kg = **0.0054** (dimensionless) Non-volatile fraction: Reference Solution-3.279 kg* (24.42 % + 22.17%) = 1.528 kg; 1.528 kg/100.497 kg = **0.0152** (dimensionless)		

Truncated AGDISP Model Deposition Results (Example from MRID 49615001)

	Testing Day 27-April-2015								
Downwind distance, ft	Deposition, fraction of applied								
	GF-2726, beginning of testing day			GF-2726, end of testing day			WC-2015		
	Rep1	Rep2	Rep3	Rep1	Rep2	Rep3	Rep1	Rep2	Rep3
0	0.656073	0.660996	0.63293	0.638476	0.649221	0.647057	0.654611	0.65092	0.636206
6.6	9.18E-02	8.90E-02	9.74E-02	9.74E-02	9.66E-02	9.79E-02	9.68E-02	0.1002	9.98E-02
13.1	6.25E-02	6.05E-02	6.69E-02	6.71E-02	6.61E-02	0.067733	0.066746	6.91E-02	6.84E-02
19.7	4.83E-02	4.66E-02	5.19E-02	5.24E-02	5.10E-02	5.26E-02	0.051838	5.37E-02	5.29E-02
26.2	0.039916	3.84E-02	4.15E-02	4.22E-02	4.06E-02	4.21E-02	4.15E-02	4.31E-02	4.22E-02
32.8	3.48E-02	3.34E-02	0.036233	3.72E-02	3.54E-02	3.67E-02	3.65E-02	3.80E-02	3.70E-02
39.4	2.89E-02	2.76E-02	3.15E-02	3.26E-02	3.07E-02	3.18E-02	3.17E-02	3.32E-02	3.22E-02
45.9	2.72E-02	2.60E-02	2.98E-02	3.09E-02	2.89E-02	2.99E-02	3.00E-02	3.15E-02	3.05E-02
52.5	0.02379	0.02265	2.61E-02	2.73E-02	2.53E-02	2.61E-02	2.64E-02	2.79E-02	2.69E-02
59.1	2.18E-02	2.07E-02	2.40E-02	2.53E-02	0.023225	0.023933	2.43E-02	2.59E-02	2.48E-02
65.6	2.14E-02	2.03E-02	2.16E-02	2.30E-02	2.09E-02	2.15E-02	2.20E-02	0.023512	2.25E-02
72.2	2.08E-02	1.98E-02	2.09E-02	2.22E-02	2.01E-02	2.07E-02	2.12E-02	2.27E-02	2.17E-02
78.7	1.99E-02	1.89E-02	2.01E-02	2.14E-02	1.94E-02	1.99E-02	2.04E-02	0.021923	2.09E-02
85.3	1.86E-02	1.77E-02	1.89E-02	2.02E-02	1.83E-02	1.87E-02	1.93E-02	2.07E-02	1.98E-02
91.9	1.70E-02	1.61E-02	1.74E-02	1.87E-02	1.68E-02	1.72E-02	1.77E-02	1.91E-02	1.82E-02
98.4	1.51E-02	0.014301	0.015646	1.68E-02	1.51E-02	1.54E-02	1.59E-02	1.72E-02	1.63E-02
105.0	1.31E-02	1.24E-02	1.38E-02	1.48E-02	1.33E-02	1.35E-02	0.013939	1.51E-02	1.44E-02
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2598.4	0	0	0	1.27E-04	0	0	0	8.20E-05	8.20E-05
2605.0	0	0	0	1.26E-04	0	0	0	7.98E-05	7.98E-05

Appendix D
AGDISP Modeled Depositions at 30 ft Downwind Deposition

Table D-1. AGDISP modeled Depositions at 30 ft Downwind (MRID 49615001)

	Deposition, fraction of applied			
Treatment	Rep1	Rep2	Rep3	Mean (SD)
Enlist Duo – 27-apr-2015 - beginning	0.03767	0.03624	0.03879	0.03757 (0.00128)
Enlist Duo + WC-2015 – 27-apr-2015	0.03898	0.04055	0.03958	0.03970 (0.00079)
Enlist Duo – 27-apr-2015 - end	0.03964	0.03795	0.03935	0.03898 (0.00090)
Enlist Duo – 28-apr-2015 - beginning	0.03886	0.03763	0.04008	0.03886 (0.00123)
Enlist Duo + WC-2015-28-apr-2015	0.03737	0.03762	0.03934	0.03811 (0.00107)
Enlist Duo – 28-apr-2015 - end	0.03795	0.03984	0.03894	0.03891 (0.00095)

Table D-2. AGDISP modeled Depositions at 30 ft Downwind (MRID 49876702)

	Deposition, fraction of applied			
Treatment	Rep1	Rep2	Rep3	Mean (SD)
Enlist Duo – 03-Mar-2015 - beginning	0.0391	0.0388	0.0385	0.0388 (0.0003)
Enlist Duo + Fixate	0.0393	0.0427	0.0394	0.0405 (0.002)
Enlist Duo – 03-Mar-2015 - end	0.0389	0.0393	0.0397	0.0393 (0.0004)

Table D-3. AGDISP modeled Depositions at 30 ft Downwind (MRID 49876703)

	Deposition. fraction of applied			
Treatment	Rep1	Rep2	Rep3	Mean (SD)
Enlist Duo – 17-Feb-2015 - beginning	0.0412	0.0402	0.0386	0.04 (0.0013)
Enlist Duo + InterLock	0.0387	0.0384	0.0395	0.0388 (0.0006)
Enlist Duo – 17-Feb-2015 - end	0.0411	0.0419	0.0381	0.0404 (0.002)

Table D-4. AGDISP modeled Depositions at 30 ft Downwind (MRID 49876704)

	Deposition. fraction of applied			
Treatment	Rep1	Rep2	Rep3	Mean (SD)
Enlist Duo – 27-jan-2015 - beginning	0.0393	0.0404	0.0393	0.0397 (0.0006)
Enlist Duo + Liberate	0.0364	0.0366	0.0338	0.0356 (0.0016)
Enlist Duo – 27-jan-2015 - end	0.0379	0.0388	0.0398	0.0388 (0.0009)

Table D-5. AGDISP modeled Depositions at 30 ft Downwind (MRID 49876705)

	Deposition, fraction of applied			
Treatment	Rep1	Rep2	Rep3	Mean (SD)
Enlist Duo – 29-jan-2015 - beginning	0.0421	0.0401	0.0380	0.04 (0.002)
Enlist Duo + PowerShot!	0.0390	0.0393	0.0428	0.0404 (0.0021)
Enlist Duo – 29-jan-2015 - end	0.0404	0.0398	0.0396	0.0399 (0.0004)

Table D-6. AGDISP modeled Depositions at 30 ft Downwind (MRID 49876706)

	Deposition, fraction of applied			
Treatment	Rep1	Rep2	Rep3	Mean (SD)
Enlist Duo – 17-Feb-2015 - beginning	0.0393	0.0404	0.0393	0.0397 (0.0006)
Enlist Duo + R-11	0.0375	0.0346	0.0378	0.0366 (0.0018)
Enlist Duo – 17-Feb-2015 - end	0.0379	0.0388	0.0398	0.0388 (0.0009)

Table D-7. AGDISP modeled Depositions at 30 ft Downwind (MRID 49876707)

	Deposition. fraction of applied			
Treatment	Rep1	Rep2	Rep3	Mean (SD)
Enlist Duo – 29-jan-2015 - beginning	0.0421	0.0401	0.0380	0.04 (0.002)
Enlist Duo + Request	0.0390	0.0393	0.0428	0.0404 (0.0021)
Enlist Duo – 29-jan-2015 - end	0.0404	0.0398	0.0396	0.0399 (0.0004)

Table D-8. AGDISP modeled Depositions at 30 ft Downwind (MRID 49876708)

	Deposition. fraction of applied			
Treatment	Rep1	Rep2	Rep3	Mean (SD)
Enlist Duo – 27-Jan-2015 - beginning	0.0393	0.0404	0.0393	0.0397 (0.0006)
Enlist Duo + Savvy	0.0375	0.0346	0.0378	0.0366 (0.0018)
Enlist Duo – 27-Jan-2015 - end	0.0379	0.0388	0.0398	0.0388 (0.0009)

Table D-9. AGDISP modeled Depositions at 30 ft Downwind (MRID 49876709)

	Deposition, fraction of applied			
Treatment	Rep1	Rep2	Rep3	Mean (SD)
Enlist Duo – 28-jan-2015 - beginning	0.0397	0.0389	0.0381	0.0389 (0.0008)
Enlist Duo + Woodside	0.0380	0.0387	0.0369	0.0378 (0.0009)
Enlist Duo – 28-jan-2015 - end	0.0401	0.0403	0.0402	0.0402 (0.0001)

Appendix F

Table F-1. Selected Drop Size Distributions for Quality Check Results (MRID 49615001)

Deionized water sprays	Beginning of testing day		End of testing day	
Testing 27-Apr-2015				
	$DV_{0.5}$	% < 150 µm	$DV_{0.5}$	% < 150 µm
Rep1	413.0	6.72	421.2	6.96
Rep2	415.0	7.17	403.6	7.76
Rep3	427.1	6.6	407.8	7.73
Means	418.4	6.83	410.9	7.48
Percent change, beginning to end of day	1.8%	-9.6%		
Testing 28-Apr-2015				
	$DV_{0.5}$	% < 150 µm	$DV_{0.5}$	% < 150 µm
Rep1	414.8	7.02	419.5	7.33
Rep2	421.5	6.73	421.1	7.08
Rep3	424.0	6.32	417.5	6.99
Means	420.1	6.69	419.4	7.13
Percent change, beginning to end of day	0.17%	-6.6%		

Table F-2. Selected Drop Size Distributions for Quality Check Results (MRID 49876702)

Deionized water sprays	Beginning of testing day		End of testing day	
	$DV_{0.5}$	% < 150 µm	$DV_{0.5}$	% < 150 µm
Rep1	411.70	7.96	438.78	7.05
Rep2	414.57	7.96	444.90	6.93
Rep3	423.75	7.22	430.10	6.28
Means	416.67	7.71	437.93	6.75
Percent change, beginning to end of day	5.10%	-12.45%		

Table F-3. Selected Drop Size Distributions for Quality Check Results (MRID 49876703)

Deionized water sprays	Beginning of testing day		End of testing day	
	$DV_{0.5}$	% < 150 ∞m	$DV_{0.5}$	% < 150 ∞m
Rep1	413.7	8.20	406.95	8.73
Rep2	403.9	8.64	402.92	8.6
Rep3	414.7	7.62	409.59	8.05
Means	410.8	8.15	406.49	8.46
Percent change, beginning to end of day	-1.04%	3.76%		

Table F-4. Selected Drop Size Distributions for Quality Check Results (MRID 49876704)

Deionized water sprays	Beginning of testing day		End of testing day	
	$DV_{0.5}$	% < 150 µm	$DV_{0.5}$	% < 150 µm
Rep1	424.06	7.47	416.2	7.27
Rep2	411.45	7.62	423.18	6.6
Rep3	409.00	7.95	426.83	6.71
Means	414.84	7.68	422.07	6.86
Percent change, beginning to end of day	1.74%	-10.68%		

Table F-5. Selected Drop Size Distributions for Quality Check Results (MRID 49876705)

Deionized water sprays	Beginning of testing day		End of testing day	
	$DV_{0.5}$	% < 150 µm	$DV_{0.5}$	% < 150 µm
Rep1	427.3	7.23	422.9	7.19
Rep2	426.9	7.19	424.0	6.92
Rep3	422.1	8.45	416.2	7.88
Means	425.4	7.62	421.0	7.33
Percent change, beginning to end of day	-1.03%	-3.85%		

Table F-6. Selected Drop Size Distributions for Quality Check Results (MRID 49876706)

Deionized water sprays	Beginning of testing day		End of testing day	
	$DV_{0.5}$	% < 150 µm	$DV_{0.5}$	% < 150 µm
Rep1	413.71	8.20	406.95	8.73
Rep2	403.86	8.64	402.92	8.60
Rep3	414.69	7.62	409.59	8.05
Means	410.75	8.15	406.49	8.46
Percent change, beginning to end of day	-1.04%	3.76%		

Table F-7. Selected Drop Size Distributions for Quality Check Results (MRID 49876707)

Deionized water sprays	Beginning of testing day		End of testing day	
	$DV_{0.5}$	% < 150 µm	$DV_{0.5}$	% < 150 µm
Rep1	427.3	7.23	422.9	7.19
Rep2	426.9	7.19	424.0	6.92
Rep3	422.1	8.45	416.2	7.88
Means	425.4	7.62	421.0	7.33
Percent change, beginning to end of day	-1.03%	-3.85%		

Table F-8. Selected Drop Size Distributions for Quality Check Results (MRID 49876708)

Deionized water sprays	Beginning of testing day		End of testing day	
	$DV_{0.5}$	% < 150 ∝m	$DV_{0.5}$	% < 150 ∝m
Rep1	424.06	7.47	416.2	7.27
Rep2	411.45	7.62	423.18	6.60
Rep3	409.00	7.95	426.83	6.71
Means	414.84	7.68	422.07	6.86
Percent change, beginning to end of day	1.74%	-10.68%		

Table F-9. Selected Drop Size Distributions for Quality Check Results (MRID 49876709)

Deionized water sprays	Beginning of testing day		End of testing day	
	$DV_{0.5}$	% < 150 µm	$DV_{0.5}$	% < 150 µm
Rep1	423.5	6.78	417.2	7.39
Rep2	416.7	7.20	424.9	7.19
Rep3	418.6	7.10	421.1	6.98
Means	419.6	7.03	421.1	7.19
Percent change, beginning to end of day	0.35%	2.3%		